

PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements relating to the Control of Electrically Driven Conveyors.

We, METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED, of St. Paul's Corner, 1—3 St. Paul's Churchyard, London, E.C.4, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

- 10 This invention relates to the control of electrically driven conveyors for loose materials and has an important application in controlling the feed of chain grate stokers for steam boilers.
- 15 In controlling the rate of feed of chain grate stokers it is known to employ variable speed A.C. commutator type motors. Such arrangements, however, normally require a comparatively complicated control circuit and hence tend to become expensive to install.
- 20 It is also known to use mechanical types of speed control, for example, multi-speed gear boxes or slipping clutches in the mechanical drive between a constant speed electric motor and the stoker. These latter arrangements, however, suffer from the disadvantage that in addition to the expense of installation they are difficult to operate from the boiler control board.
- 25 It has been found with many types of conveyors such as chain grate stokers, that periodic speed variations or even periodic stops for short periods of time are permissible provided that the average rate of feed is maintained constant.
- 30 The present invention comprises the combination of a conveyor for feeding loose materials, such as a chain grate stoker for a boiler, with one or more electric motors driving said stoker conveyor and an on-off switch assembly controlling the electric supply to said motor or motors, said switch

assembly comprising a continuously rotating rotor adapted to actuate a plurality of unit on-off switches in respective different angular positions together with means for selecting the number of unit on-off switches effective to supply the motor so as to control the proportion of time during each revolution of the rotor that the motor is supplied with current.

It will be appreciated that the unit switches may be in the main motor supply if the motor current is not excessive whilst in cases where the motor current is too high to permit this they may actuate a contactor switch controlling the motor supply.

Preferably the unit switches are cam operated. Clearly in such a case the cam may have more than one actuating surface around its periphery.

According to one embodiment of the invention the unit switches are uniformly distributed around the cam and each unit switch is connected through an isolating switch to one side of the supply, the isolating switches being ganged to be operated from a common control in such a manner that in position 1 of the control the isolating switch is closed and the circuit is completed for No. 1 unit switch, in position 2 the circuit is still completed for No. 1 unit switch and in addition for No. 2 unit switch, whilst in position 3 a circuit for Nos. 1, 2 and 3 unit switches are all completed and so forth.

It will be appreciated that when an isolating switch is open the associated unit switch on closing will fail to complete the circuit. In such an arrangement there will be one position, i.e. a full-load position, in which all the isolating switches are closed so that when the cam rotates, power is supplied through each of the unit switches in turn and hence there is a continuous supply of power to the motor.

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- Preferably the cam is dimensioned so that when No. 1 switch has been closed it will not allow this switch to reopen until No. 2 switch has been closed so that the circuit is maintained continuously during each "on" period.
- Alternatively to a cam and cam operated switches the rotor and unit switches may be constituted by a commutator and brushes, either of which (commutator or brushes) is fixed and the alternate part rotates.
- In order that the invention may be more completely understood reference will now be made to the accompanying drawing which shows diagrammatically an arrangement embodying the invention and showing only those features which are essential to an understanding of the invention.
- In the drawing the reference 1 indicates a motor under control, driving a conveyor for feeding loose materials. The main A.C. supply to the motor 1 is fed through a contactor switch 2 having an operating coil 3, the circuit through which is controlled in accordance with the invention by the following arrangement. The main supply is fed through a multipole multiway selector switch 4 to the unit switches.
- A continuously rotating pilot motor 5 drives a cam member 6. The unit switches 7A, 7B, 7C, 7D, 7E, 7F are distributed uniformly about the cam member 6. It will be observed that as the cam rotates each unit switch will be closed for a part of the rotation. The unit switches 7A, 7B . . . are connected to corresponding isolating switches 8A, 8B . . . The isolating switches are ganged and the selector switch 4 operates in such a manner that a selected number of isolating switches are closed and the rest are open with the result that a similar number of unit switches are effective and the rest non-effective whereby the motor 1 is energised during each revolution of the rotor for a time proportional to the ratio of number of effective to number of non-effective switches. It will be appreciated that the diagram depicts the case where all the unit switches are effective. If the pointer of the selector switch is moved in a clockwise manner to the next position only five of the unit switches will be effective.
- What we claim is :—
1. A conveyor for feeding loose materials provided with an on-off switching arrangement for controlling the electric supply to a motor driving said conveyor comprising a continuously rotating rotor adapted to actuate a plurality of unit on-off switches in respective different angular positions together with means for selecting the number of unit on-off switches effective to supply the motor so as to control the proportion of time during each revolution of the rotor that the motor is supplied with current. 55
 2. Apparatus as claimed in Claim 1, wherein the rotor comprises a single cam member and the unit switches are uniformly distributed round said single cam member, and wherein each unit switch is connected in series with an isolating switch, each isolating switch being operated from a common control, said control selecting the number of operative isolating switches, and consequently the number of operative unit switches. 60
 3. Apparatus as claimed in either one of the preceding claims, wherein the rotor is so dimensioned that one unit switch is prevented from re-opening until the consecutive one is closed. 65
 4. Apparatus as claimed in Claim 1, wherein the rotor and unit switches are constituted by a set of relatively rotating commutators and brushes. 70
 5. A chain grate stoker driven by an electric motor and having control apparatus substantially as herein described with reference to the accompanying drawing. 75

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PROVISIONAL SPECIFICATION.

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- It is also known to use mechanical types of speed control, for example, multi-speed gear

- boxes or slipping clutches in the mechanical drive between a constant speed electric motor and the stoker. These latter arrangements, however, suffer from the disadvantage that in addition to the expense of instalment they are difficult to operate from the boiler control board.
- It has been found with many types of conveyors such as chain grate stokers, that periodic speed variations or even periodic stops for short periods of time are permissible provided that the average rate of feed is maintained constant.
- The present invention comprises the combination of a conveyor for loose materials such as a chain grate stoker for a boiler, with one or more electric motors driving said stoker conveyor and an on-off switch assembly controlling the electric supply to said motor or motors, said on-off switch assembly comprising a plurality of unit switches actuated in different angular positions of a rotating rotor together with means for selecting the number of unit switches effective to supply the motor so as to control the proportional time during each revolution of the rotor that the motor is supplied with current.
- It will be appreciated that the unit switches may be in the main motor supply if the motor current is not excessive whilst in cases where the motor current is too high to permit this they may actuate a contactor switch controlling the motor supply.
- Preferably the unit switches are cam operated. Clearly in such a case each cam may have more than one actuating surface around its periphery.
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719,668 COMPLETE SPECIFICATION

1 SHEET

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the Original on a reduced scale.*

